The War on Terrorism vs. Open Exchange of Scientific Information

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DTIC
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The Persephone Effect

Joseph Heintz der Ältere, 1564–1609: Der Raub der Proserpina. Photo © Maicar Förlag – GML.

Risk of a Persephone Effect

- Inherent in how biological science is conceived, designed, performed and communicated.
- Pervasive because Biology is inherently dual-use– DNA is DNA is DNA
- May be unavoidable if we wish to take advantage of benefits of biological science

Perspective

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Delivery of Biological Agents by Aerosols

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Alkermes, Inc., Cambridge, MA 02139

Figure 2. Commercially available dry powder and metered-dose inhalers.
Courtesy of Alkermes, Inc., Cambridge, MA. These inhalers represent portable, handheld, single- or multiple-use inhaler devices for delivering drugs for respiratory disease. New inhalation technology currently in the clinic may employ devices of greater technical sophistication.

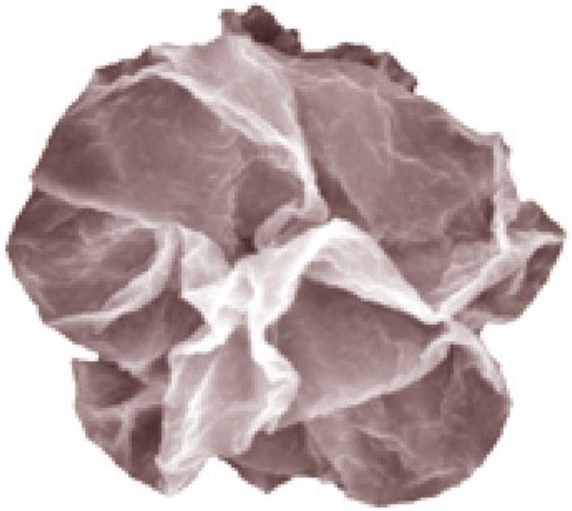
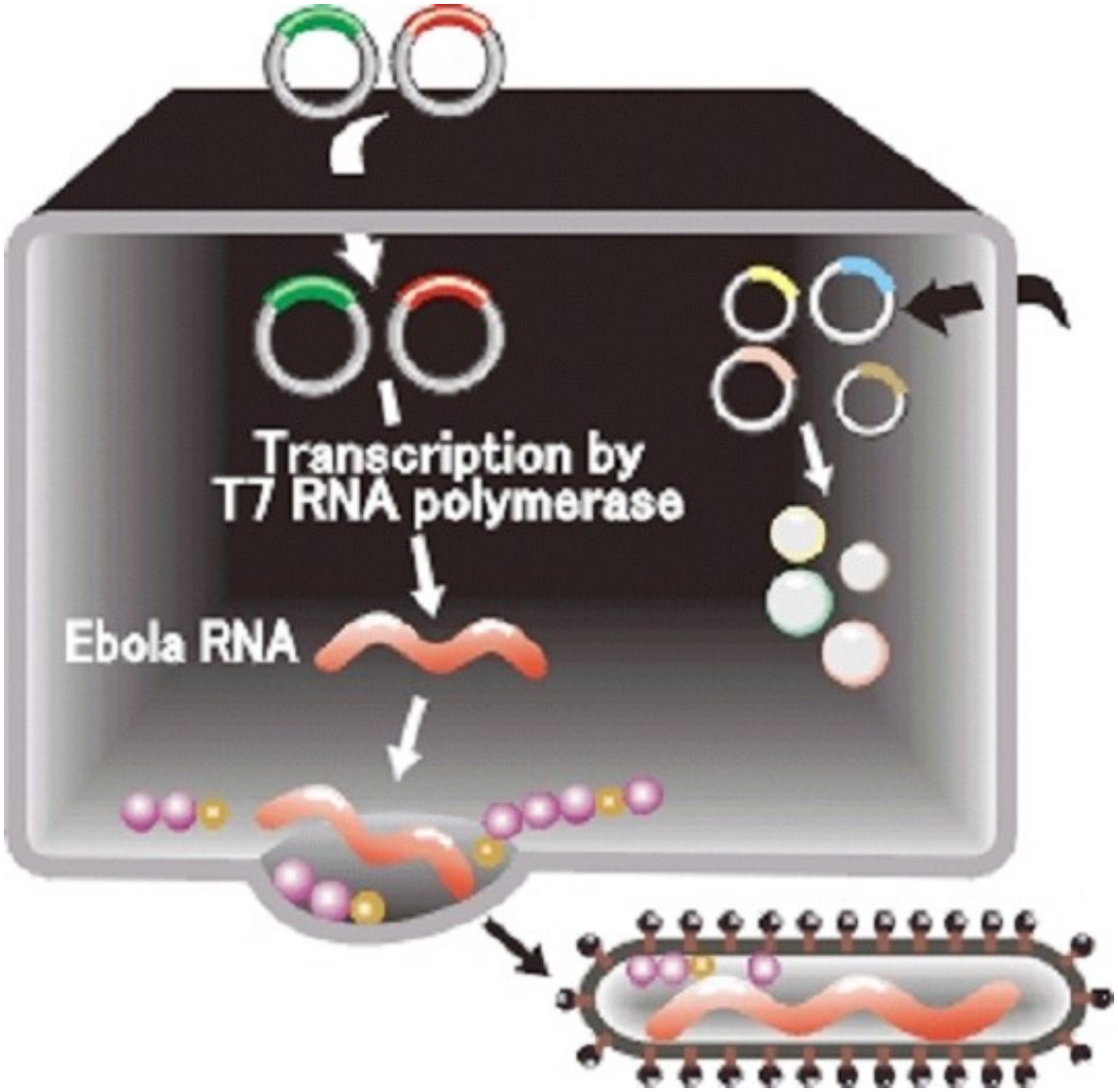


Figure 3. Large (8-μm-dia.) porous drug particle.
Courtesy of Dr. Michael Lipp, Alkermes, Inc., Cambridge, MA.


Transcription by
T7 RNA polymerase
Ebola RNA

ELSEVIER

Vaccine 19 (2001) 2629–2636

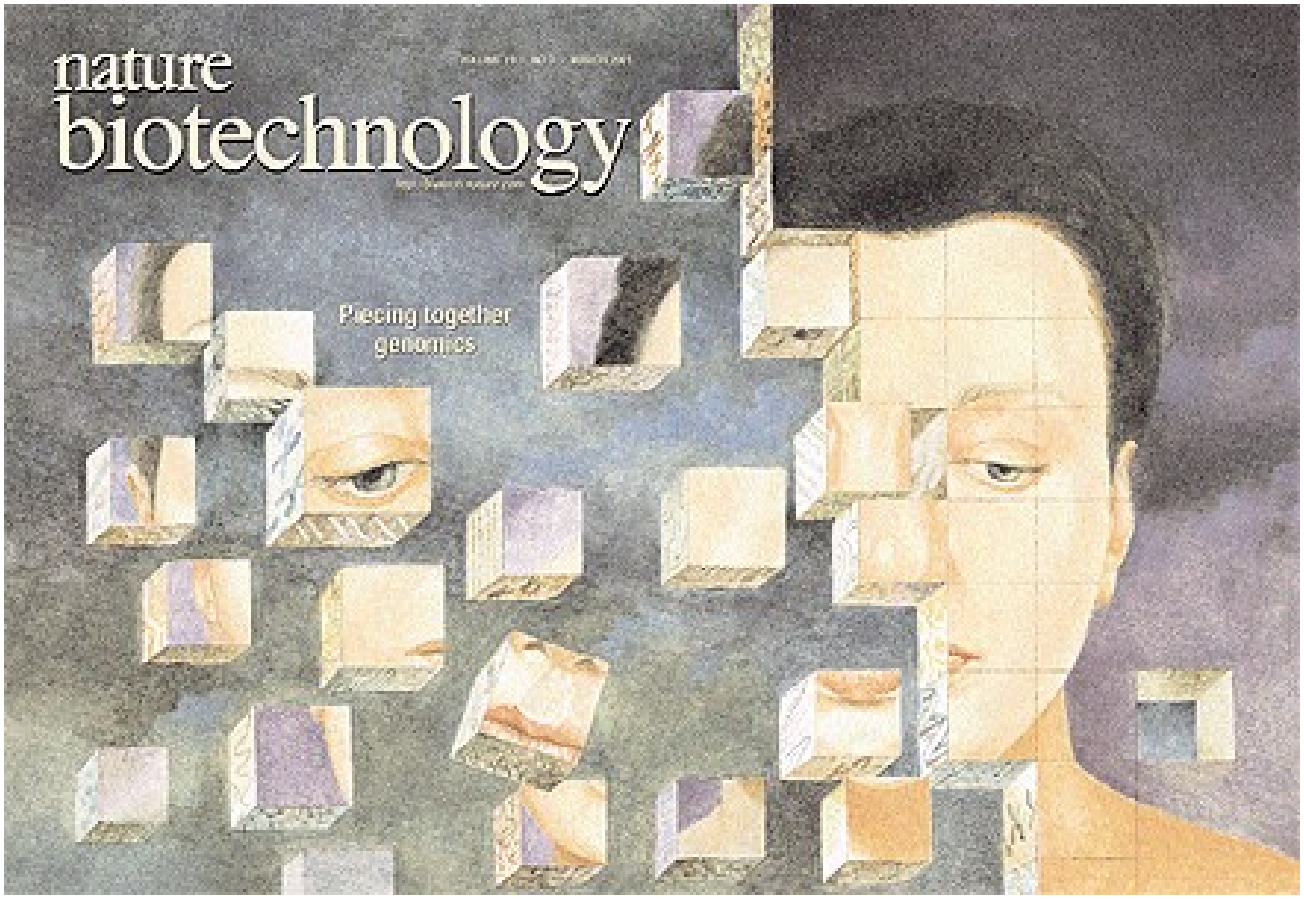
Vaccine

www.elsevier.com/locate/vaccine

A powder formulation of measles vaccine for aerosol delivery

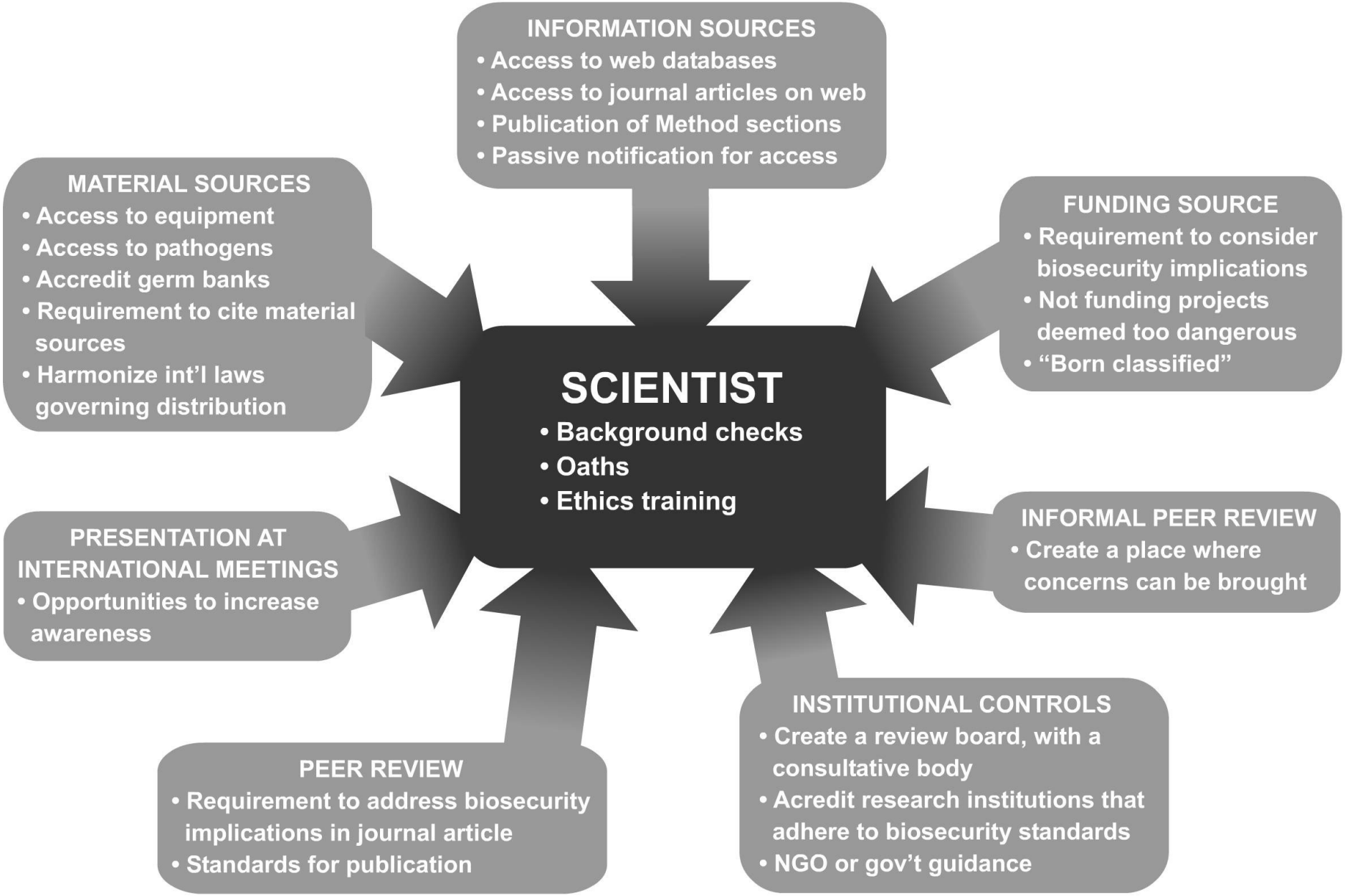
Cynthia LiCalsi *, Michael J. Maniaci, Troy Christensen, Elaine Phillips, Gary H. Ward, Clyde Witham

Dura Pharmaceuticals, 7475 Lusk Blvd., San Diego, CA 92121, USA


nature
biotechnology
Piecing together
genomics

Giving the Advantage to Biodefense

- Growing power of science increases destructive potential of a biological attack.
- “Contentious” research is pervasive, constantly evolving, and usually of beneficent value as well
- How can we increase biodefense **and** constrain malignant applications of bioresearch?
- Influencing change requires leveraging **what matters most** to working scientists and research institutions.


INFORMATION SOURCES
• Access to web databases
• Access to journal articles on web
• Publication of Method sections
• Passive notification for access
MATERIAL SOURCES
• Access to equipment
• Access to pathogens
• Accredit germ banks
• Requirement to cite material sources
• Harmonize int'l laws governing distribution
FUNDING SOURCE
• Requirement to consider biosecurity implications
• Not funding projects deemed too dangerous
• "Born classified"
SCIENTIST
• Background checks
• Oaths
• Ethics training
PRESENTATION AT INTERNATIONAL MEETINGS
• Opportunities to increase awareness
INFORMAL PEER REVIEW
• Create a place where concerns can be brought
PEER REVIEW
• Requirement to address biosecurity implications in journal article
• Standards for publication
INSTITUTIONAL CONTROLS
• Create a review board, with a consultative body
• Acredit research institutions that adhere to biosecurity standards
• NGO or gov't guidance

What matters most to bench researchers

- **Responsibility:** scientists accept responsibility for societal implications of their research; however, tunnel vision is problem.
- **Freedom of inquiry:** researchers abhor constraints; acceptance hinges on perceived legitimacy of issue and degree of control they can still exercise.
- **Peer respect:** bioscientists will defer to peers and respected bodies such as NAS and ASM; scientific integrity and credibility valued.
- **Research funding:** money talks, but "richer" universities and labs will refuse research with cumbersome "strings"
  - "I don't think there are a lot of scientists in the US who feel that they have unlimited resources to do their work… If you impact the money stream, you certainly will get a response." –M
- **Local institutional management:** degree of administrative control tolerable related to proximity – local ones adhered to (by far) over national or global ones.

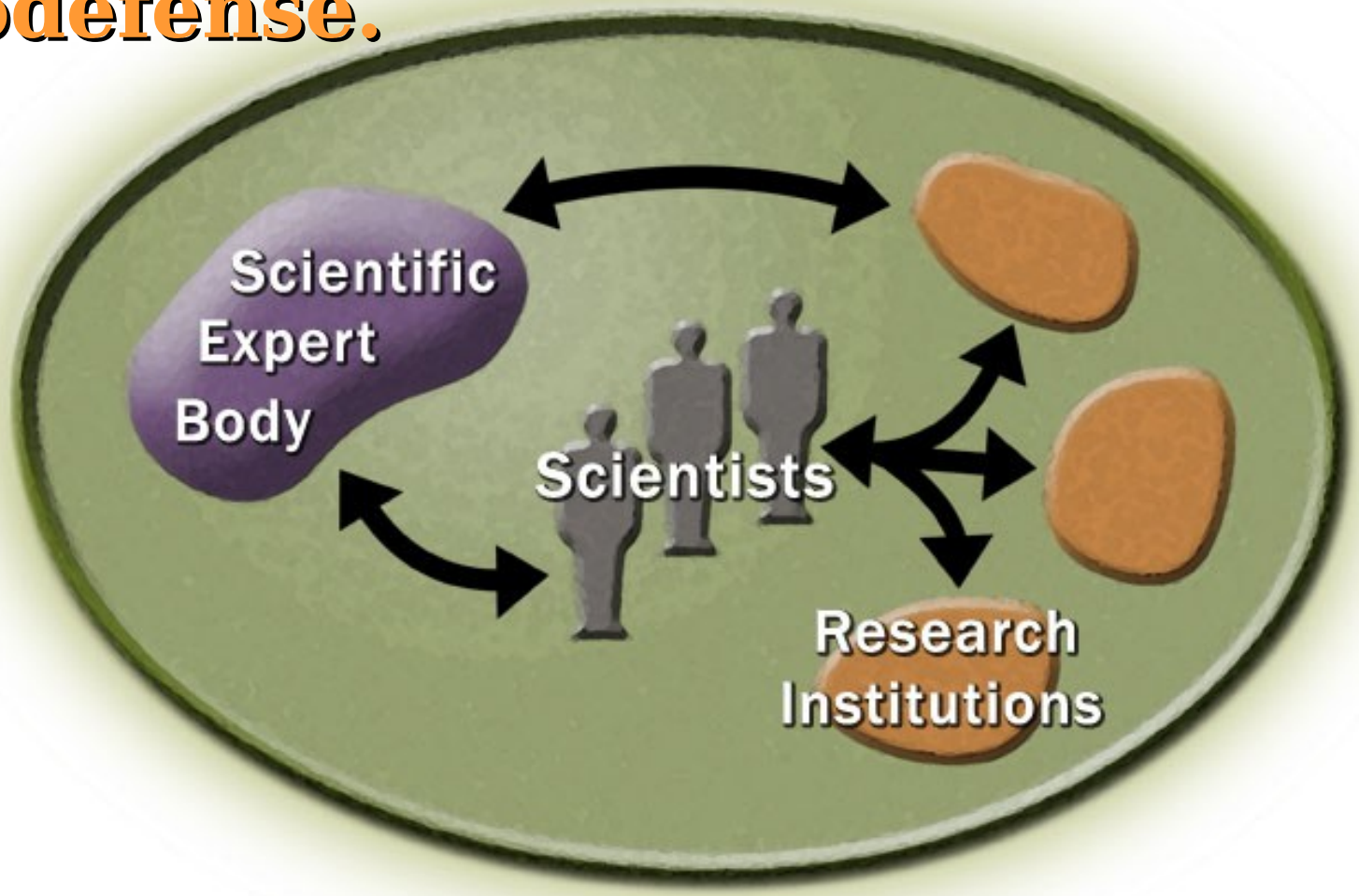
Biosecurity principles: the balance between biodefense progress and nat'l security

- 'Dangerous' biology cannot be defined or separated from beneficent biology
- Must be flexible, adaptive, and distributed– traditional "command and control" won't work. Instead, "bottom-up."
- Must build on the strengths of existing research incentives and values. (freedom to publish and peer review)
- Science is global, but biosecurity can be national
- Bioscience must engage with gov't for effectiveness
- Support of scientists essential-must be seen as legitimate

With self-governance, Accountability becomes The Issue: Old questions apply

- Examples: Internet, Accounting (Enron, Arthur Anderson, Global Crossing)
- What is the societal responsibility of science?
- To whom should scientists be accountable?
- For biosecurity, is effective accountability somewhere between government oversight and status quo?

Proposed Framework for Self-Governance... and increasing biodefense.



Roles of research institutions…

- **Provide local oversight:**
  - "Well, you know, not too many scientists work out of their basements or garages. I mean most of them have to plug into an organization like this or have some adult supervision." --T
  - "When the university itself starts to take that much trouble to make sure you're following the rules, then you start to toe the line a little bit more"--S

- **Conduct peer review and discussions:** (phage wars and hypervirulence)

- **Tailor core biosecurity goals to institutional needs:** flexibility reflecting different insititutional capabilities and needs.

Institutions will…

- Link awareness of biosecurity concerns to graduate education and ongoing research activities– provide legitimacy
- Foster active exposition of vulnerabilities in research
- Actively engage scientists in the development of countermeasures that advance biosecurity
  - This can't happen: "There was just a tremendous movement of people into AIDS research, with the impact not really affecting AIDS very much-- saved more careers than lives…And I think [biodefense] will be a similar thing."—W
- Establish biosecurity norms and codes of conduct for practicing scientists

"Scientific Expert Body"…

"I'd want some group that would be knowledgeable enough of science to … provide feedback. Government bureaucrats might end up defining what's of concern and they don't really know what they are talking about" Y

- Develop and maintain governing principles that research institutions can tailor for their needs.
- Act as a clearinghouse for best practices
- See the biodefense "forest"– can be a resource for other government agencies (biodefense strategy)
- Calibration of these authorities is the important work ahead:
  - Empanel special reviews of research developments
  - Operate under government mandate
  - Evaluate research institution compliance/ research institution heads can certify compliance
  - Ties to government funding

Questions:

- Is scientific self-governance feasible?
- How do we address accountability in self-governance?
- How important is awareness of biosecurity concerns at the laboratory level?
- Does it make sense to strengthen communication and influence between the national security communities and biological science?